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SOIL INVESTIGATION FOR THE
GUADALUPE RIVER PROJECT
REALIGNMENT WITHIN REACH 1

Santa Clara County, California

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1962

WOODWARD-CLYDE-SHERARD & ASSOCIATES

Consulting Soil and Foundation Engineers

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REPORT

to

SANTA CLARA COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT
70 West Rosa Street
San Jose 10, California

on

SOIL INVESTIGATION FOR THE GUADALUPE RIVER PROJECT REALIGNMENT WITHIN REACH 1

Santa Clara County, California

by

WOODWARD-CLYDE-SHERARD AND ASSOCIATES
Consulting Soil & Foundation Engineers
Oakland, California

WOODWARD-CLYDE-SHERARD AND ASSOCIATES

P. O. BOX 8253 • OAKLAND 8, CALIFORNIA
TELEPHONE HIGATE 4-1256
Consulting Soil and Foundation Engineers

DENVER, COLO.
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OAKLAND, CALIF.
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June 29, 1962

Job No. 4246

Santa Clara County Flood Control
and Water Conservation District
70 West Rosa Street
San Jose 10, California

Attention: Dwight H. Smith, Project Coordinator

Gentlemen:

In accordance with your request we have made a supplemental soil investigation for the realignment of the proposed channel and levee system within Reach 1 of the Guadalupe River Project, in Santa Clara County, California. A previous investigation for the entire system was reported on November 18 and December 30, 1960.

The enclosed report contains recommendations regarding the construction of levees and widening of the channel.

The Staff Engineer assigned to this project was Mr. George E. Hervert.

Very truly yours,

WOODWARD-CLYDE-SHERARD & ASSOCIATES

Stanley F Gizienski

Stanley F. Gizienski, R.E. 10352

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REPORT

to

SANTA CLARA COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

on

SOIL INVESTIGATION FOR THE
GUADALUPE RIVER PROJECT
REALIGNMENT WITHIN REACH 1

Santa Clara County, California

SCOPE

This report describes a subsurface investigation along the proposed realignment of a portion of Reach 1, Guadalupe River channel straightening and widening project. The initial soil investigation for Reaches 1 and 2 was done by our firm and reports issued on November 18 and December 30, 1960. The current investigation involves a short section of an alternate realignment within the original Reach 1. The site lies northwest of the Shell Plant and Southern Pacific Railroad tracks near the town of Alivso, California. The purpose of this investigation was to investigate the subsurface materials and determine their compressibility and shear characteristics. Recommendations are also given regarding slope inclinations and utilization of excavated material in levees. One sample of subsurface water was taken to determine if the water was fresh or sea water.

FIELD EXPLORATION

Three exploratory holes were drilled at the locations shown on the site plan, Fig. 1. The enclosed site plan is an overlay of the larger site plan, (4246-Fig. 3) included in our report dated November 18, 1960. Undisturbed samples were taken from the holes. The drilling was done on May 29 and 31, 1962, under the supervision of our staff engineering geologist, who visually classified the soils in the field. Boring logs were prepared from the field data and these, together with the results of laboratory tests, are presented as Figs 2 through 4. A detailed description of our drilling and sampling techniques is given as an appendix to the boring logs.

LABORATORY TESTS

The water content, dry density, and unconfined compressive strength were determined for representative undisturbed samples recovered from the borings. The resistance to penetration of the sampler, water content, dry density and unconfined compressive strength are shown at the corresponding sample location on the logs of borings, Figs. 2 through 4.

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The results of a consolidation test on soft Bay Mud are shown in Fig. 5 in the form of void ratio against pressure and percent against time curves.

The results of the chemical analysis of a sample of water taken from Hole 3 at a depth of 16 to 18 ft are shown in Table 1.

SITE AND SOIL CONDITIONS

The site is essentially level with a pond of water located in the vicinity of Hole 3.

Our Hole 1, located within the existing roadway indicates that soft Bay Mud extends to a depth of 30 ft. Below the Bay Mud loose to medium dense sand and stiff silty clay are encountered to a depth of 51 ft. In Holes 2 and 3 the soft Bay Mud deposit extends to a depth of 6 ft, below which stiff to very stiff silty clay is found to a depth of 28 ft and medium dense sand to 50 ft. In Hole 3, between the depths of 14 to 16 ft, a sand layer was found and water first encountered; after the drilling was done in this hole the water level stabilized 6 ft below the ground surface. The water levels in Holes 1 and 2 stabilized at a depth of 3 ft.

DISCUSSION AND RECOMMENDATIONS

General. This investigation shows that the site of the proposed channel in this reach is underlain by varying soil conditions. In the vicinity of Hole 1, the soft Bay Mud extends to a depth of 30 ft while in Hole 2 and 3 the Bay Mud extends to 6 ft. No shear tests, other than the unconfined compression tests, were made on the soils taken from the borings. It is our opinion that the previous reports contained sufficient data on strength to permit evaluation of the soils identified and encountered in this investigation.

Design Slopes. It is recommended that in the vicinity of Hole 1 the levee or fill slopes constructed of uncompacted material not exceed an inclination of 4 to 1 (4 horizontal to 1 vertical) for heights up to 10 ft, and 5 to 1 for higher fills. Cut slopes made in the soft Bay Mud should not exceed 5 to 1.

In the vicinity of Holes 2 and 3 it is recommended that the Bay Mud be excavated to a depth of 6 ft and the levees placed by mechanical equipment. If constructed of acceptable material the levee slopes may be placed at an inclination of 2½ to 1. The cut slopes in the stiff clays underlying the Bay Mud should not exceed an inclination of 2½ to 1.

Fill Material. It is anticiapted that Bay Mud and stiff clays beneath will be excavated in the process of the channel widening. It is estimated that at least 10 percent of the excavated Bay Mud material will be unsatisfactory for use in the levee construction while all of the stiff clays obtained from the excavation can be utilized. Placement of dredged material should be controlled to limit the lift thickness to 2 ft and the material allowed to drain for 2 weeks before placing the next lift. If the excavated material is permitted to dry out in order to utilize mechanical land equipment the levees or fill may be constructed more rapidly.

Seepage. Our current borings do not encounter pervious material above a depth of 14 ft. Seepage problems beneath the levee system therefore, are not expected to develop.

Settlement. The settlement in the vicinity of Hole 1 is expected to be of the order and magnitude indicated on Fig. 77, included in our December 30, 1960 report. The consolidation test made for this investigation indicates consolidation characteristics similar to those obtained by the tests made previously. The ultimate settlement beneath levees about 6 ft high constructed in the vicinity of Holes 2 and 3 is estimated to be of the order of 6 in. It is anticipated that there will be some differential settlement in the levee system between Hole 1 and 2 due to the variable thicnkess of Bay Mud.

Water Sample. The results of the chemical analysis on a sample of water taken from Hole 3 show the water is brackish salt water. It is noted on the boring log that an artesian condition exists in the sand layer at the depth sampled.

LIMITATIONS

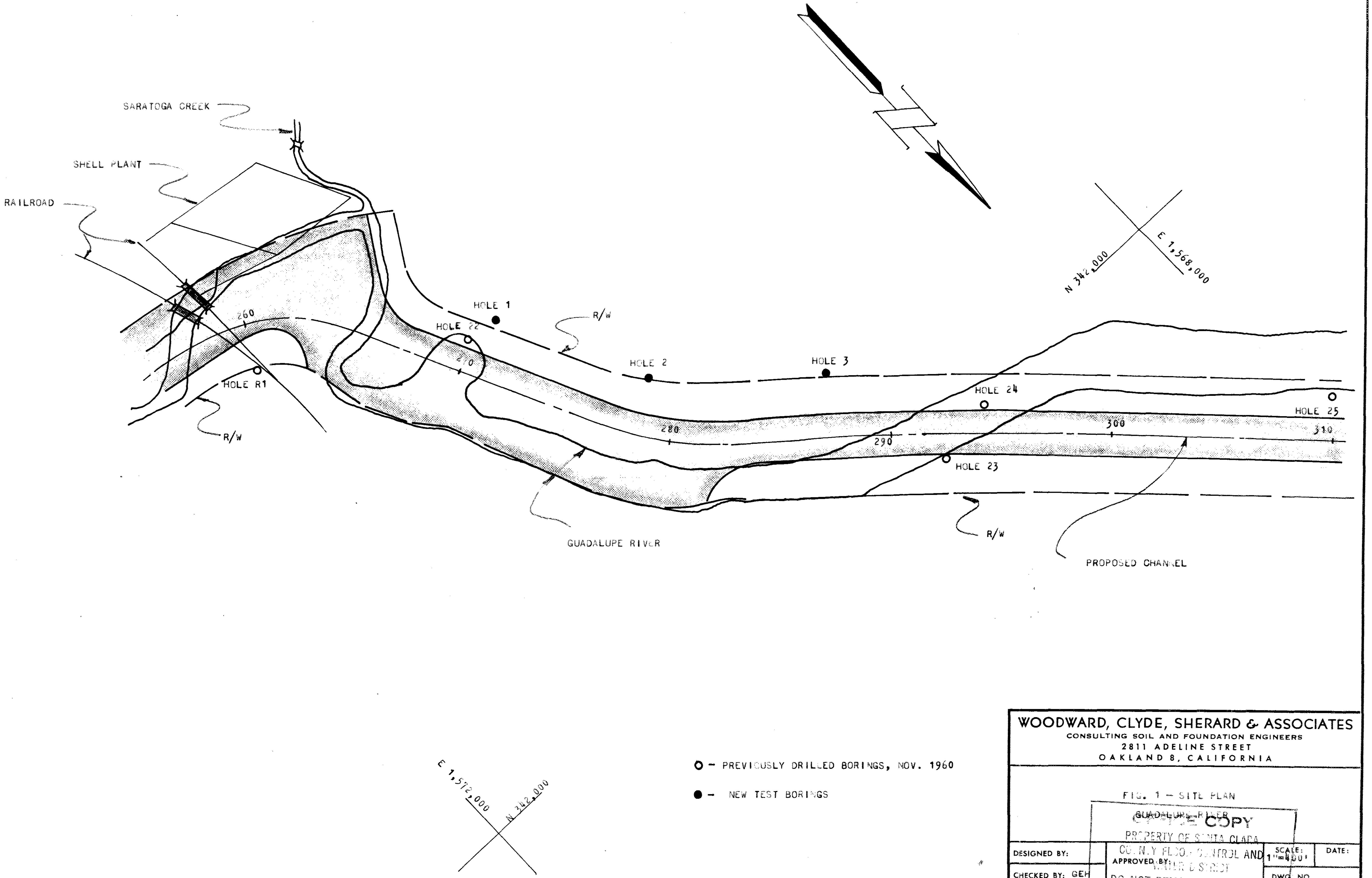
The recommendations contained in this report are based on the results of current borings and a comparison of the results of laboratory tests made in this and the previous investigation. If there are any question regarding the recommendations the Soil Engineer should be consulted.

TABLE 1 - CHEMICAL ANALYSIS

Specific conductance at 25°C Micromhos	140,000
pH Value	6.8

	Parts per Million
Calcium (Ca)	1,120
Magnesium (Mg)	4,860
Sodium (Na)	36,000
Iron (Fe	2
Silica (Si02)	Less than .01
Sulfates (S04)	7,456
Chlorides (Cl)	65,601
Nitrates (N03)	negative
Carbonates (C03)	negative
Bicarbonates (HC03)	1,054
Alkalinity (Methyl Orange as CaC03)	864
Total hardness as CaC03	22,800

This water is brackish, salt water, and unsuitable for any domestic use.



○ – PREVIOUSLY DRILLED BORINGS, NOV. 1960

● – NEW TEST BORINGS

WOODWARD, CLYDE, SHERARD & ASSOCIATES
CONSULTING SOIL AND FOUNDATION ENGINEERS
2811 ADELINE STREET
OAKLAND 8, CALIFORNIA

FIG. 1 – SITE PLAN
GUADALUPE RIVER

DESIGNED BY:
CHECKED BY: GEH
DRAWN BY: KO
APPROVED BY:
R. E. NO.
SCALE: 1"=400'
DATE:
DWG. NO. 5135 – 1

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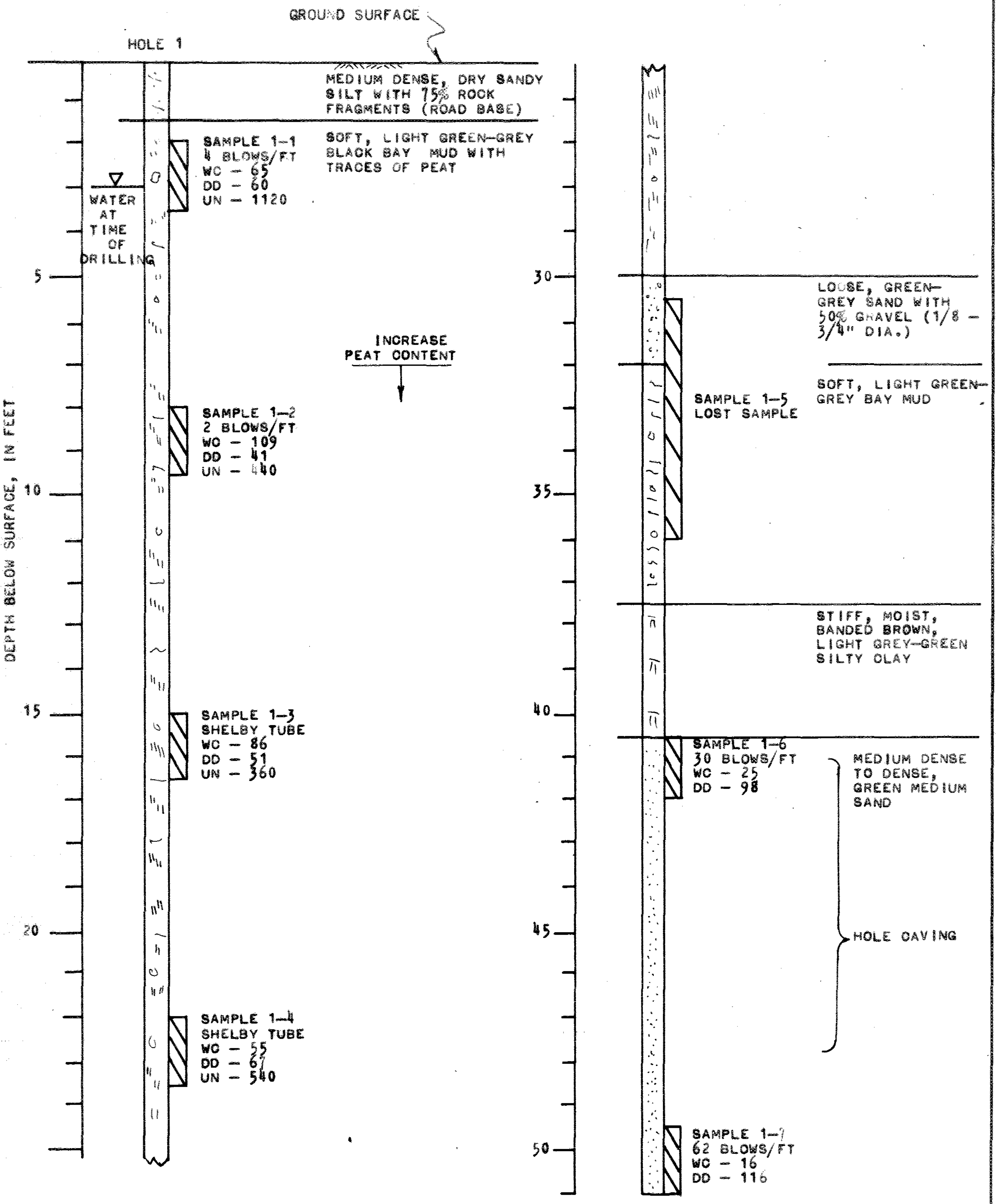

GROUND SURFACE
HOLE 1
MEDIUM DENSE, DRY SANDY SILT WITH 75% ROCK FRAGMENTS (ROAD BASE)
SAMPLE 1-1
4 BLOWS/FT
WC – 65
DD – 60
UN – 1120
SOFT, LIGHT GREEN-GREY BLACK BAY MUD WITH TRACES OF PEAT
WATER AT TIME OF DRILLING
INCREASE PEAT CONTENT
SAMPLE 1-2
2 BLOWS/FT
WC – 109
DD – 41
UN – 440
DEPTH BELOW SURFACE, IN FEET
5
10
15
20
SAMPLE 1-3
SHELBY TUBE
WC – 86
DD – 51
UN – 360
SAMPLE 1-4
SHELBY TUBE
WC – 55
DD – 67
UN – 540
30
35
40
45
50
LOOSE, GREEN-GREY SAND WITH 50% GRAVEL (1/8 – 3/4" DIA.)
SOFT, LIGHT GREEN-GREY BAY MUD
SAMPLE 1-5
LOST SAMPLE
STIFF, MOIST, BANDED BROWN, LIGHT GREY-GREEN SILTY CLAY
SAMPLE 1-6
30 BLOWS/FT
WC – 25
DD – 98
MEDIUM DENSE TO DENSE, GREEN MEDIUM SAND
HOLE CAVING
SAMPLE 1-7
62 BLOWS/FT
WC – 16
DD – 116

FIG. 2 — LOG OF BORINGS

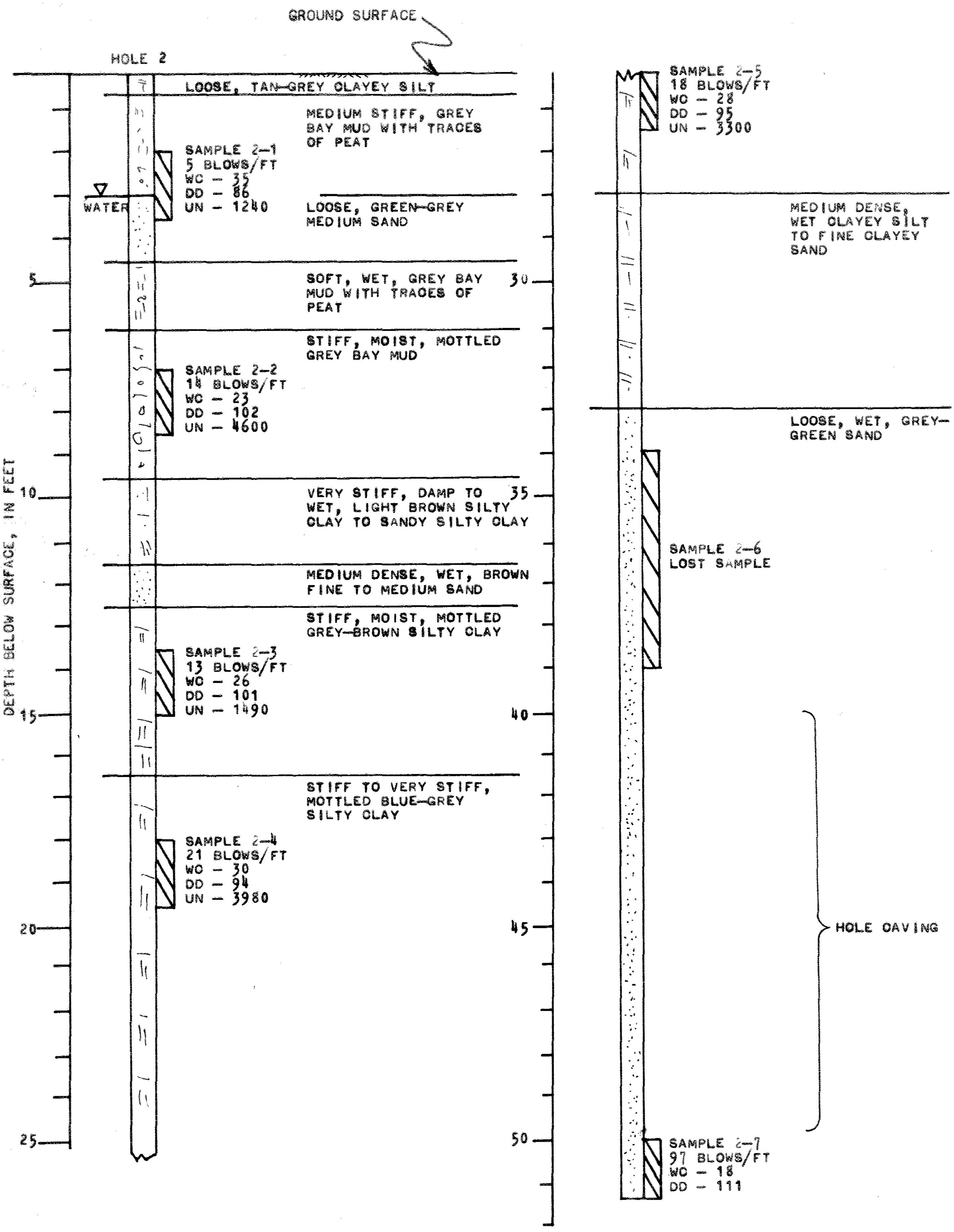

GROUND SURFACE
HOLE 2
LOOSE, TAN-GREY CLAYEY SILT
MEDIUM STIFF, GREY BAY MUD WITH TRACES OF PEAT
SAMPLE 2-1
5 BLOWS/FT
WC - 35
DD - 86
UN - 1240
WATER
LOOSE, GREEN-GREY MEDIUM SAND
SOFT, WET, GREY BAY MUD WITH TRACES OF PEAT
STIFF, MOIST, MOTTLED GREY BAY MUD
SAMPLE 2-2
14 BLOWS/FT
WC - 23
DD - 102
UN - 4600
VERY STIFF, DAMP TO WET, LIGHT BROWN SILTY CLAY TO SANDY SILTY CLAY
MEDIUM DENSE, WET, BROWN FINE TO MEDIUM SAND
STIFF, MOIST, MOTTLED GREY-BROWN SILTY CLAY
SAMPLE 2-3
13 BLOWS/FT
WC - 26
DD - 101
UN - 1490
STIFF TO VERY STIFF, MOTTLED BLUE-GREY SILTY CLAY
SAMPLE 2-4
21 BLOWS/FT
WC - 30
DD - 94
UN - 3980
DEPTH BELOW SURFACE, IN FEET
5
10
15
20
25
30
35
40
45
50
SAMPLE 2-5
18 BLOWS/FT
WC - 28
DD - 95
UN - 3300
MEDIUM DENSE, WET CLAYEY SILT TO FINE CLAYEY SAND
LOOSE, WET, GREY-GREEN SAND
SAMPLE 2-6
LOST SAMPLE
HOLE CAVING
SAMPLE 2-7
97 BLOWS/FT
WC - 18
DD - 111

FIG. 3 — LOG OF BORINGS

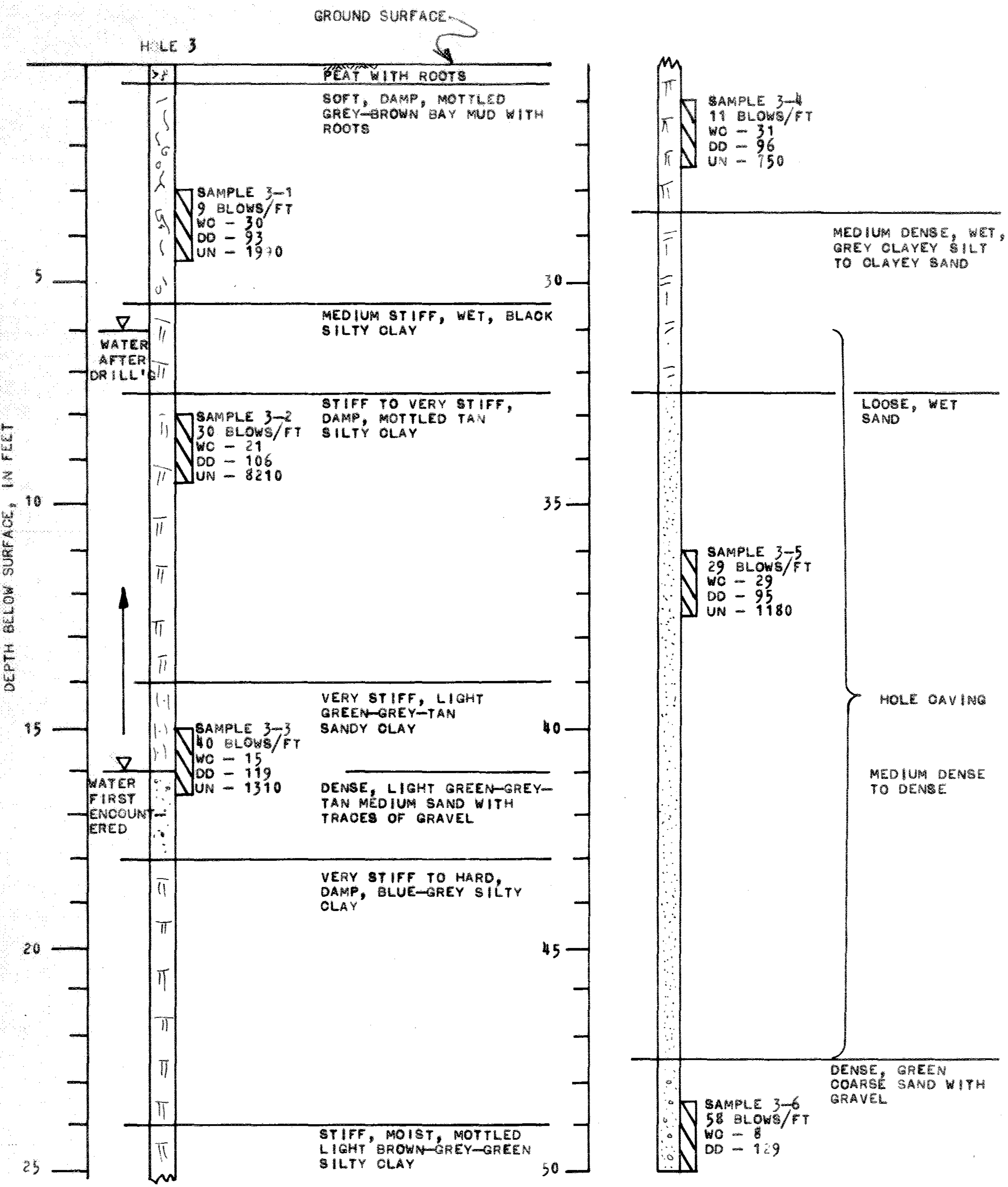
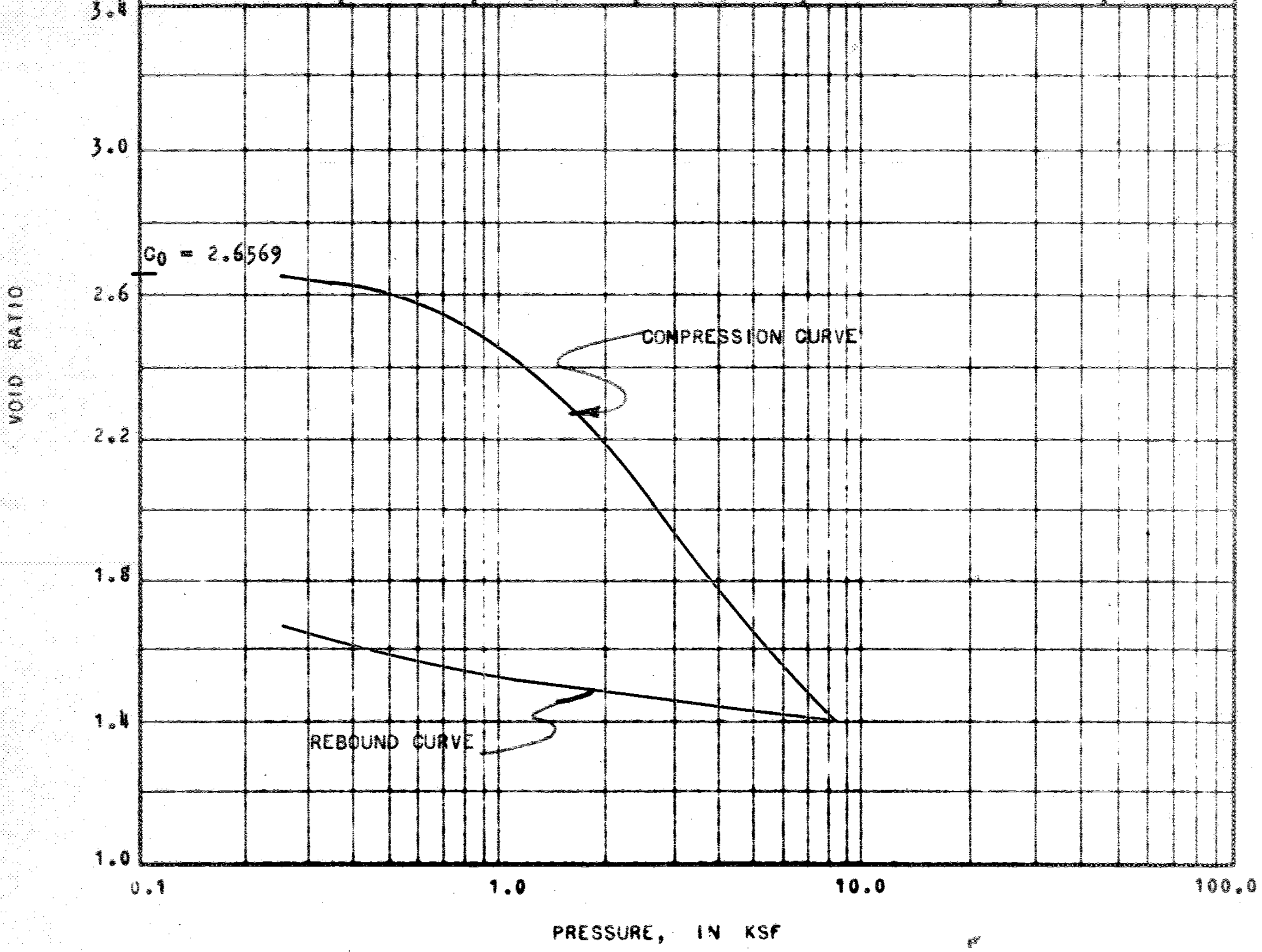
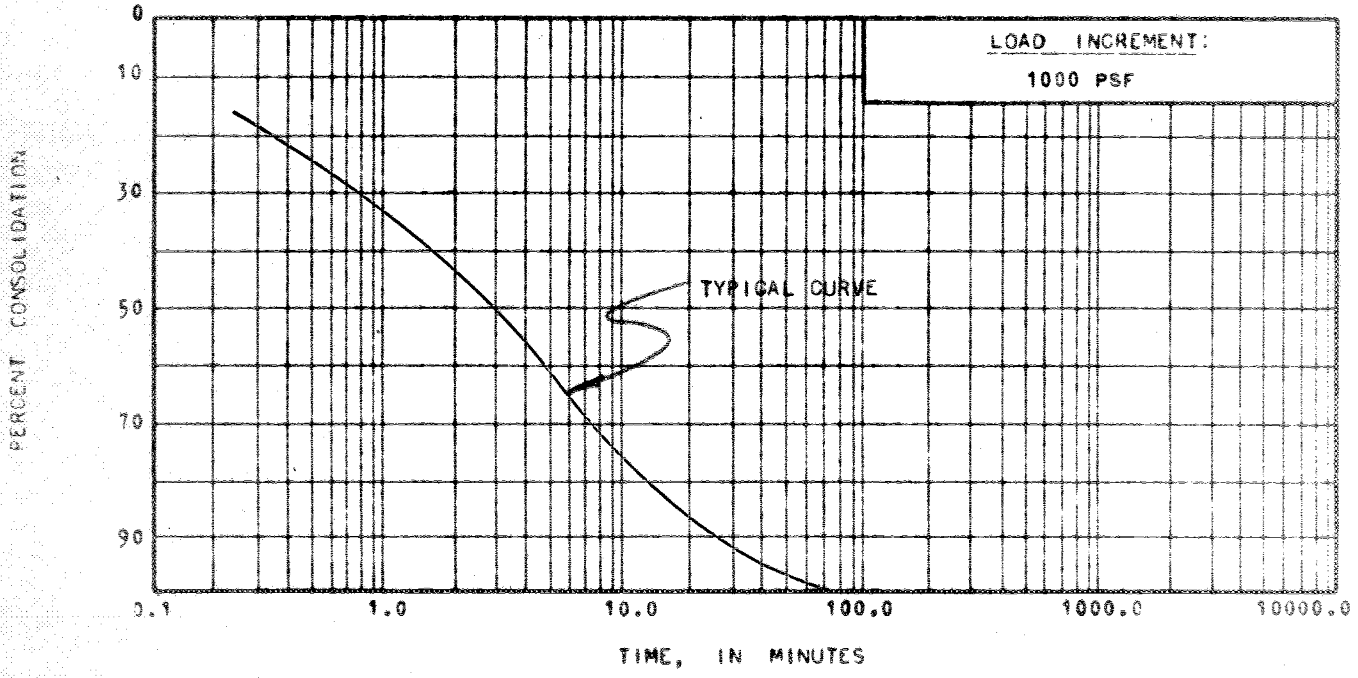

GROUND SURFACE
HOLE 3
DEPTH BELOW SURFACE, IN FEET
PEAT WITH ROOTS
SOFT, DAMP, MOTTLED GREY-BROWN BAY MUD WITH ROOTS
SAMPLE 3-1
9 BLOWS/FT
WC - 30
DD - 93
UN - 1990
5
MEDIUM STIFF, WET, BLACK SILTY CLAY
WATER AFTER DRILL'G
STIFF TO VERY STIFF, DAMP, MOTTLED TAN SILTY CLAY
SAMPLE 3-2
30 BLOWS/FT
WC - 21
DD - 106
UN - 8210
10
VERY STIFF, LIGHT GREEN-GREY-TAN SANDY CLAY
15
SAMPLE 3-3
40 BLOWS/FT
WC - 15
DD - 119
UN - 1310
WATER FIRST ENCOUNTERED
DENSE, LIGHT GREEN-GREY-TAN MEDIUM SAND WITH TRACES OF GRAVEL
VERY STIFF TO HARD, DAMP, BLUE-GREY SILTY CLAY
20
STIFF, MOIST, MOTTLED LIGHT BROWN-GREY-GREEN SILTY CLAY
25
SAMPLE 3-4
11 BLOWS/FT
WC - 31
DD - 96
UN - 750
MEDIUM DENSE, WET, GREY CLAYEY SILT TO CLAYEY SAND
30
LOOSE, WET SAND
35
SAMPLE 3-5
29 BLOWS/FT
WC - 29
DD - 95
UN - 1180
HOLE CAVING
40
MEDIUM DENSE TO DENSE
45
DENSE, GREEN COARSE SAND WITH GRAVEL
SAMPLE 3-6
58 BLOWS/FT
WC - 8
DD - 129
50

FIG. 4 - LOG OF BORINGS

#5735

SAMPLE NO.	SUMMARY OF TEST RESULTS					
1-3 (16')	SPECIFIC GRAVITY	MOISTURE CONTENT, (%)	DRY DENSITY, (PCF)	PERCENT OF SATURATION, (%)	HEIGHT (IN.)	DIAMETER (IN.)
INITIAL	2.75	98.2	96.9	100	.9418	2.80
FINAL		61.0	64.8	100	.6818	





CONSOLIDATION TEST

FIG. 5

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